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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

REPORT NO. [redacted]

CD NO.

COUNTRY Germany (Russian Zone)

DATE DISTR. 7 July 1950

SUBJECT Production, Experimentation at the Buna-Werke, Schkopau

NO. OF PAGES 14

PLACE ACQUIRED [redacted] 25X1A

DATE OF INFO.

NO. OF ENCLS. (LISTED BELOW)

SUPPLEMENT TO REPORT NO.

25X1

[redacted]

THIS IS UNEVALUATED INFORMATION

[redacted] 25X1

A copy of the Provisional Report on Experiments to Improve the Qualities of Aluminum Oxide as Active White Filling Agent in Rubber Mixtures of the Schkopau Buna Plant, dated 8 February 1949 is forwarded.

25X1A [redacted] Comment:

a. The Buna Plant in Schkopau is assigned to the Kaustik Soviet Corporation and its production is partly combined in the Leuna Plant schedule. Part of the plant was dismantled in June 1948. The following official 1949 production plan provides for an annual buna production of 27,000 tons. This estimate is exaggerated and will probably not be reached due to the dismantling. At present, the plant has the following estimated annual production capacity:

Carbide	300,000 tons	
Buna S 3	20,000 tons	
Igelit PCU	7,200 tons	(polyvinylchloride)
Polystyrol	400 tons	
Ethylene oxide	9,000 tons	
Butanol	3,600 tons	
Trichlorethylene	3,000 tons	
Methyl acetate) Ethyl acetate) Butyl acetate)	8,000 tons	
Acetone	2,400 tons	
Acetic acid	14,000 tons	
Formaldehyde	2,900 tons	
Anhydride of plotalic acid	3,000 tons	
Chlorine	33,000 tons	
Caustic soda	3,600 tons	
Aluminum chloride	7,000 tons	
Lubricating oil	3,500 tons	

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b. (1) Soviet management personnel:

General manager: Nezarov
Manager: Ratasov (Eng)
Manager: Stolyazov (Eng)
Engineer Golovin
Engineer Fritzeff
Maj Gomsharenko

(2) German management personnel:

Manager Dr. Melles, chief of the plant
Manager Dr. Moll
First engineer Schumacher, chief of the technical and construction section
Diplomkaufmann (academic degree of political economy) Roehr, chief of the commercial and auditing section

3. The report indicates the kind and trend of experiments for the improvement of the properties of aluminum oxide to be used as active filling agent for rubber mixtures. The abbreviations used in the tabulations are presumably to be explained as follows:

F. - coefficient of strength
D. - elongation
bl.D. - permanent elongation
El. - strain
H. - hardness
Defo. - deformation degree

Provisional Report on Experiments to Improve the Qualities of Aluminum Oxide as Active White Filling Agent in Rubber Mixtures

1. The purpose of this provisional report is to acquaint the technical personnel of the plant with the results of experiments made to find an improved aluminum oxide composition to be used as active filling agent. Research activities are not completed but the results achieved so far can be used as a basic method in the manufacturing procedure.

2. The first patent for the use of aluminum oxide as filling agent was applied for in 1941 by the Deutsche Gold- und Silberscheideanstalt Firm. In this application aluminum oxide was mentioned as highly active filling agent for natural and synthetic rubber. By using aluminum oxide as the filling agent the tensile strength of butadiene rubber is increased to 208 kg/cm^2 and the strength limit is 462 percent.

3. In tests by Dr. Nelles and Dr. Hauschulz in the Buna plant and tests by Dr. Pattok in the Farbenfabrik Wolfen, the addition of aluminum oxide (obtained from alum or aluminum sulphate) indicates an excessive degree of deformation (10,000 to 20,000 or more) although the solidity of the vulcanized material is increased (200-280 kg/cm^2).

Rubber mixtures with such a high deformation degree cannot be processed in rubber plants. Therefore the industrial use of aluminum oxide as an active filling agent was not practicable in the form proposed by the Deutsche Gold- und Silberscheideanstalt Firm.

The value of aluminum oxide as filling material is also considerably reduced due to its excessive static stretch dilation (40 to 80 percent).

4. Dr. Nelles and Dr. Hauschulz made special tests to obtain aluminum oxide with a normal rate of mixture deformation. Small quantities of inorganic salts of alkali-metals and other metals were added to the sulphate before the heating process. The tests had no practical results. Although the degree of deformation declined, the tensile strength of the vulcanized material decreased considerably.

5. It is probable that the addition of alkali-salts at a heating temperature of 900° to 1,000°C leads to the formation of nonactive meltings with aluminum oxide or favors sintering of aluminum oxide particles due to their size or shape or the condition of the surface, thus producing nonactive forms. Dr. Espich tried to solve the problem of the low degree of deformation by the same procedure. He also added various inorganic salts to the basic raw material before heating. However, his tests did not lead to any positive results either.

The following data were listed in the experiments of Dr. Espich:

Table 1

Designation of material	Mixture	Heating degree (C)	F	D	bl.D	Bel	El	H	Mixture	Defo Weight
Al_2O_3, E-17 5 kg alum and 68-16.5 g NaCl	92	20'/2.1	138	520	55	71	49	68	6550/39	100 cm^3-
		40'	157	475	46	87	50	70		18.6 g
		60'	167	460	40	99	50	70		
		80'	160	435	33	103	50	71		
		100'	167	440	33	107	50	71		
		60'/3.0	174	465	34	109	50	72		
Al_2O_3, E-18 5 kg alum and 68-16.5 g fluoride	92	20'/2.1	102	450	29	77	50	74	6550/28	100 cm^3-
		40'	98	360	20	87	50	75		24.2 g
		60'	102	365	20	91	50	76		
		80'	101	335	17	93	50	77		
		100'	102	330	16	96	50	78		
		60'/3.0	99	325	15	93	50	76		
Al_2O_3, E-19 3.5 kg aluminum sulphate	92	20'/2.1	129	420	53	90	48	74	12050/38	100 cm^3-
		40'	141	400	43	104	48	75		21.2 g
		60'	149	385	41	112	48	76		
		80'	155	375	39	121	48	76		
		100'	151	360	34	124	48	76		
		60'/3.0	147	355	31	122	48	76		
Al_2O_3, E-20 3.5 kg aluminum sulphate C 3-ga " Buna -16/5 fluoride	92	20'/2.1	97	455	22	71	53	74	5250/32	100 cm^3-
		40'	98	405	19	79	53	74		25.5 g
		60'	96	390	18	80	54	75		
		60'	101	395	18	83	54	75		
		100'	87	340	13	81	54	75		
		60'/3.0	91	360	14	80	53	75		

Summarizing the mentioned tests [redacted] aluminum oxide is not suitable as a filling agent in the proposed form. However, the research is significant as it proves, for the first time, that the tensile strength of vulcanized material is considerably increased by adding to the rubber mixture aluminum oxide obtained from alum or aluminum sulphate through disintegration at high temperature. Aluminum oxide can be used as active filling agent in the rubber industry only after the problem of reducing the degree of deformation to a normal figure (1,500 to 3,000) has been solved. By reducing the degree of deformation many other qualities of vulcanized materials are also improved (stretch, stretch dilation coefficient and so on). Our research work was done to solve this problem. 25X1

25X1 6. Description of [redacted] experiments to improve the qualities of aluminum oxide.

25X1 Contrary to the experiments of Dr. Nelles and Dr. Mauschulz [redacted] to achieve the reduction of the degree of raw deformation by processing the finished aluminum oxide with organic substances and not by adding various inorganic substances to the raw material during aluminum oxide production.

a. The first method consists in adding softening agents to the mixtures in order to obtain a reduction of the degree of deformation. For this purpose paraffinic acid was added to the rubber mixture in quantities of 2, 3, 5 and 8 percent.

The results show that by adding 2 percent of paraffinic acid only a slight decrease of the degree of deformation occurred. The addition of paraffinic acid in greater quantities leads to a reduction of the degree of deformation and to a reduction of the tensile strength of vulcanized material (see table 3). This method was abandoned due to unsatisfactory results.

b. The second method consisted in covering the surface of the aluminum oxide with the layer of organic matter to decrease the friction between rubber and filling agent thus reducing the degree of raw deformation. This represents an absolutely new procedure in the rubber industry.

While examining silipur as an active filling agent, obtained through precipitation of silikosol sulphate by means of an ammoniacal solution of sodium sulphate, Dr. Pattok tried various materials to increase the moistening property of the filling agent in the rubber compound. The following materials were tested:

I.G. wax, chloric rubber, styrol, raw rubber, I.G. wax N (new) and benzyl cellulose. These materials were first dissolved in water or benzol and in this condition coated on the surface of the filling agent. As shown by the table below the used materials not only reduced the degree of solidity but also increased the degree of the deformation of the raw mixtures.

Table 2

Filling material	Filling weight	Defo	F	D	Bl.D	E	H
Silica gel powder/ silipur not processed	13	5500	76	595	33	56	69
Silipur 636 with IG wax suspension	28	7050	19	330	29	57	69
Silipur 638 with chloric rubber	25	9050	24	275	36	57	73
Silipur 693 with styrol solution	20	11050	25	230	17	58	75
Silipur 640 with raw rubber	25	6550	22	309	33	57	69
Silipur 642 with IG wax N	20	9550	22	320	29	54	74
Silipur 644 with benzyl cellulose	21	9050	22	335	35	56	72

These data show that the second method of solving the problem was at first a failure.

c. At a meeting with the Chief Engineer General Kirpichnikov in charge, first engineer Khcheyan suggested, for the first time, obtaining a low degree of deformation by submitting the finished aluminum oxide to an additional process.

Tests were started to lower the degree of deformation of raw buna mixtures by processing aluminum oxide with organic matters. A simple procedure consisting of an additional treatment of Al_2O_3 with nekal BX_2 made in the laboratory of Engineer Zacharias proved this method to be correct. Several organic substances were then used in later tests.

7. Description of the experimental part.

Mixing formula No 92

Buna S 3	100 parts of weight
Aluminum oxide	80 parts of weight
Zinc oxide	5 parts of weight
Sulphur	2 parts of weight
Vulkasit "A"	2 parts of weight

The aluminum oxide containing mixture is rolled 15 to 20 minutes without additional treatment and 15 minutes after treatment.

The test results obtained after addition of 2 to 8 percent of **paraffinic acid to the mixture are listed in table No 3:**

Table No 3

Designation of material	Mixture	Heating degree (c)	F	D	bl.D	Bel.	El.	H.	Mixture defo	Weight
1	2	3	4	5	6	7	8	9	10	11
Al_2O_3 from Bitterfeld	92	20'/2.1	158	455	65	96	50	78	above 20,000 not noticeable, breaks	100 cm^3 - 20 g
		40'	175	460	64	105	50	79		
		60'	185	450	59	117	50	79		
		80'	208	455	58	127	50	80		
		100'	209	445	58	133	50	80		
		60'/3.0	203	445	58	129	50	80		
		60'/4.0	200	405	48	134	50	80		
		80'	189	395	49	128	50	80		
Al_2O_3 from Bitterfeld 2 percent paraffinic acid	92	20'/2.1	189	590	50	-	43	75	16550/ 48	100 cm^3 20 g
		40'	215	555	46	86	43	76		
		60'	235	555	44	96	43	78		
		80'	237	540	38	104	43	79		
		100'	259	525	38	110	44	79		

1	2	3	4	5	6	7	8	9	10	11
		60'/3.0	231	495	35	116	43	79		
		60'/4.0	215	440	26	131	43	79		
		80'	224	445	28	133	43	79		
Al_2O_3 from Bitterfeld	92-3 % P.F.S.	20'/2.1	175	640	50	61	42	72	12050/47	100 cm^3- 20 g
		40'	191	605	42	68	42	74		
		60'	199	585	39	75	42	74		
		80'	228	600	42	85	43	75		
		100'	226	575	38	89	43	75		
		60'/3.0	224	545	37	89	42	75		
		60'/4.0	204	485	26	101	42	76		
		80'	213	440	24	118	42	76		
Al_2O_3 from Bitterfeld	92-5 % P.F.S.	20'/2.1	175	705	45	38	42	69	6050/35	100 cm^3- 20 g
		40'	182	650	39	49	72	71		
		60'	171	610	34	52	42	71		
		80'	183	610	36	54	43	72		
		100'	184	610	33	56	43	74		
		60'/3.0	176	590	33	58	42	74		
		60'/4.0	167	565	29	58	42	76		
		80'	206	565	29	63	42	76		
Al_2O_3 from Bitterfeld	92-8 % P.F.S.	20'/2.1	90	331	100				2000/31	100 cm^3- 20 g
		40'	88	545	14	28	42	62		
		60'	94	515	13	34	42	64		
		80'	94	490	12	36	42	65		
		100'	106	515	14	36	42	65		
		60'/3.0	98	510	13	35	42	65		
		60'/4.0	126	575	16	32	42	64		
		80'	121	575	15	31	42	65		

Final conclusions

1. Additions of 2 to 3 percent of paraffinic acid increase the solidity up to 250 kg/cm^2; they improve the ductility decrease plasticity, and slightly reduce the degree of deformation.

2. After addition of 5 percent of paraffinic acid the tensile strength decreases, the ductility improves, and the degree of deformation declines considerably but not enough.

3. A further addition of paraffinic acid produces a sharp decline of the solidity of the vulcanized material. The degree of deformation remains normal.

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8. The second test series investigated the treatment of aluminum oxide with agents to improve the mixing properties of the filling agent with rubber. These tests were based on the following procedure:

Solutions of various concentrations of the test material are prepared. Water, methanol, benzol, and xylol are used as solvents. Aluminum oxide is poured into the solution and stirred for 2 to 3 hours. The solution is then filtered and dried at a temperature of 70 to 105°C (depending on the boiling point of the solvent). After this process the aluminum oxide is ready for use.

The best results are listed in the following charts:

Table No 4

Designation	Mixture	Heating (oc)	F	D	bl.D	bel.	El.	H.	Mixture defo	Weight
1	2	3	4	5	6	7	8	9	10	11
Al_2O_3 from Bitterfeld without treatment	92	40'/2.1	175	460	64	105	550	79	not noticeable, breaks	
		60'	189	450	59	117	50	79		
		80'	208	455	58	127	50	80		
		100'	209	445	58	133	50	80		
Al_2O_3 from Bitterfeld processed with 2-% solvent E-1000	92	40'/2.1	108	605	35	33	45	66	3400/30	
		60'	119	615	35	34	45	66		
		80'	122	610	35	34	47	66		
		100'	117	590	30	36	47	68		
Al_2O_3 from Bitterfeld processed with 5-% solvent E-1000	92	40'/2.1	100	745	21	16	43	58	2400/29	
		60'	119	750	23	16	44	59		
		80'	126	735	21	19	44	60		
		100'	100	685	20	19	44	60		

1	2	3	4	5	6	7	8	9	10	11
Al_2O_3 from Bitterfeld processed with 10-% solvent E-1000	92	40'/2.1			not vulcanized					
		60'	121	775	43	28	43	65	2050/31	
		80'	151	730	41	34	43	68		
		100'	147	680	37	36	43	69		
Al_2O_3 from Bitterfeld processed with 1-% Sapal* solvent	92	40'/2.1	207	530	61	103	46	74	13000/48	
		60'	221	520	62	114	46	75		
		80'	218	530	56	108	46	75		
		100'	222	540	62	109	46	76		
Al_2O_3 from Bitterfeld processed with 3-% Sepal solvent*	92	40'/2.1	131	715	40	31	49	65	4000/25	
		60'	141	690	40	33	49	66		
		80'	128	650	34	36	49	68		
		100'	126	650	36	36	49	68		
Al_2O_3 from Bitterfeld processed with 10-% Sapal solvent*	92	40'/2.1	91	685	27	19	47	60	1900/27	
		60'	105	660	26	22	48	61		
		80'	96	610	24	24	50	61		
		100'	90	615	24	24	50	61		
Al_2O_3 from Bitterfeld processed with 1-% Seral solvent**	92	40'/2.1	204	680	45	58	43	69	8550/41	
		60'	200	640	39	60	43	71		
		80'	219	660	42	62	43	71		
		100'	215	630	38	64	44	71		
Al_2O_3 from Bitterfeld processed with 3-% Seral solvent**	92	40/2.1	209	750	37	44	39	67	7050/36	
		60'	213	730	39	45	39	70		
		80'	201	680	28	52	39	70		
		100'	234	695	31	51	40	73		
Al_2O_3 from Bitterfeld processed with 5-% Seral solvent**	92	40'/2.1	224	770	36	37	38	66	4800/39	
		60'	209	720	30	38	38	66		
		80'	235	715	29	41	38	66		
		100'	235	695	28	43	38	66		

* Sapal - oxalthylated alkylphenol
** Seral - oxalthylated paraffinic acid - C_{12}-C_{14}

1	2	3	4	5	6	7	8	9	10	11
Al_2O_3 from Bitterfeld processed with 1-% benzol acid solution	92	40'/2.1	232	760	41	42	31	71	6150/36	
		60'	235	725	36	45	31	72		
		80'	235	730	36	48	31	72		
		100'	241	710	32	48	31	72		
Al_2O_3 from Bitterfeld processed with 1-% P.F.S. solution	92	40'/2.1	149	655	18	27	47	66	3700/28	
		60'	168	650	17	30	47	66		
		80'	176	645	16	34	47	68		
		100'	175	610	15	37	47	68		
Al_2O_3 from Bitterfeld processed with 2-% P.F.S. solution	92	40'/2.1	168	815	40	24	45	61	2050/33	
		60'	160	745	37	28	45	64		
		80'	173	735	35	31	45	65		
		100'	200	745	38	31	45	65		
Al_2O_3 from Bitterfeld processed with 2-% Mersolat solution	92	40'/2.1	207	710	56	51	46	70	7550/37	
		60'	200	690	55	51	46	71		
		80'	205	675	51	58	46	71		
		100'	215	665	51	62	46	71		
Al_2O_3 from Bitterfeld processed with 3-% Mersolat solution	92	40'/2.1	211	750	68	47	42	69	5050/30	
		60'	194	730	68	44	42	70		
		80'	219	735	68	51	42	70		
		100'	212	715	65	53	42	70		
Al_2O_3 from Bitterfeld, processed with 5-% Mersolat solution	92	40'/2.1	186	730	35	28	43	60	1450/29	
		60'	200	730	35	28	43	61		
		80'	200	720	33	31	43	61		
		100'	186	705	30	31	44	61		
Al_2O_3 from Bitterfeld processed with 2-% sodium resinate solution	92	40'/2.1	255	810	62	45	38	72	4700/40	
		60'	279	765	60	53	38	75		
		80'	246	720	52	57	38	76		
		100'	300	740	49	60	34	76		

1	2	3	4	5	6	7	8	9	10	11
Al_2O_3 from Bitterfeld processed with 2-% ferro-naphtate solution	92	40'/2.1	264	770	32	31	38	63	1900/30	
		60'	254	750	28	33	38	63		
		80'	254	740	27	37	38	65		
		100'	225	710	25	30	38	65		

Table No 5

Al_2O_3 from Bitterfeld not processed	92	40'/2.1	235	540	55	104	44	74	18550/54	
		60'	230	515	47	111	43	75		
		80'	250	520	46	121	43	76		
		100'	250	515	42	122	43	78		
Al_2O_3 from Bitterfeld processed with sodium-resinate solution	92	40'/2.1	240	710	47	50	37	74	4550/21	
		60'	230	675	47	53	37	74		
		80'	246	675	46	57	37	74		
		100'	275	655	46	69	37	75		
Al_2O_3 from Bitterfeld processed with naphta-lene-sulfo-acid sodium	92	40'/2.1	168	535	87	80	48	73	9550/35	
		60'	167	515	75	84	48	73		
		80'	168	500	71	89	48	74		
		100'	173	485	62	96	48	75		
Al_2O_3 from Bitterfeld processed with 2-% so-lution of benzol sulfonic acid	92	40'/2.1	122	1125	100	18	29	65	3900/25	
		60'	171	1030	84	24	29	65		
		80'	180	955	65	26	29	69		
		100'	188	895	63	29	30	71		
Al_2O_3 from Bitterfeld processed with solution of naphthene acid	92	40'/2.1	240	710	34	38	35	66	2500/37	
		60'	225	675	31	40	35	66		
		80'	226	670	30	40	35	66		
		100'	220	645	28	43	35	66		
Al_2O_3 from Bitterfeld processed with Seliko-noel solution	92	40'/2.1	130	810	42	26	42	64	2100/28	
		60'	157	765	42	31	43	65		
		80'	154	730	38	32	43	65		
		100'	144	700	35	35	44	65		

1	2	3	4	5	6	7	8	9	10	11
Al_2O_3 from Bitterfeld processed with Zephirol solution*	92	40'/2.1	119	650	46	24	52	64	2700/14	
		60'	123	639	42	27	53	65		
		80'	105	585	38	27	54	65		
		100'	102	555	35	30	54	66		
Al_2O_3 from Bitterfeld Mersolat washed 5 times with H_2O	92	40'/2.1	177	750	35	25	44	60	2200/30	
		60'	165	700	32	28	44	61		
		80'	200	705	32	31	44	62		
		100'	185	695	32	32	44	62		

Table No 6

Experiments to Improve the Elasticity of Rubber

Al_2O_3 from Bitterfeld processed with sodium resinate solution	92**	40'/2.1	210	715	45	42	40	70	3500/31	
		60'	226	630	43	50	40	71		
		80'	264	700	47	54	42	72		
		100'	255	670	43	57	42	73		
Al_2O_3 from Bitterfeld processed with 2-5 sodium resinate solution	92***	40'/2.1	191	670	38	39	42	70	3250/25	
		60'	222	705	39	44	42	70		
		80'	234	685	39	44	42	72		
		100'	237	650	38	51	43	72		
Al_2O_3 from Bitterfeld processed with 2-% oleic-acid solution	92	40'/2.1	154	960	65	19	51	60	3000/40	
		60'	183	865	55	27	51	63		
		80'	210	860	45	29	51	64		
		100'	222	855	43	30	51	64		

* Zephirol - Mixture of akyl-dimethylbenzyl-ammoniachloride of great molecular weight

** The contents of aluminum oxide elements (as Al_2O_3) in the rubber mixture is 70 percent instead of 80 percent as stated in mixture formula No 92.

*** The contents of aluminum oxide elements (as Al_2O_3) in the rubber mixture is 65 percent.

1	2	3	4	5	6	7	8	9	10	11
Al_2O_3 from Bitterfeld processed with 3-% oleic-acid solution	92	40'/2.1	176	680	26	29	52	64	1600/22	
		60'	195	655	25	32	52	64		
		80'	200	660	24	36	52	65		
		100'	185	650	24	36	52	65		
Al_2O_3 from Bitterfeld, processed with 2-% linoleic acid solution	92	40'/2.1	190	765	36	27	45	65	2200/28	
		60'	180	725	34	28	45	66		
		80'	200	735	37	31	46	67		
		100'	200	725	30	34	47	68		
Al_2O_3 from Bitterfeld processed with 2-% solution of sodium-oleat	92	40'/2.1	156	790	52	29	47	66	2750/26	
		60'	160	760	47	30	48	67		
		80'	180	755	46	37	48	69		
		100'	200	740	45	36	48	69		
Al_2O_3 from Bitterfeld, processed with 2-% solution of sodium-linoleat	92	40'/2.1	200	720	53	40	46	68	3800/30	
		60'	197	720	52	41	46	69		
		80'	210	675	49	48	47	70		
		100'	200	650	45	50	48	71		

9. Conclusions of Abovelisted Tests

a. The processing of aluminum oxide with various agents diminishes ni friction between rubber particles and the oxide surface produces a filling agent giving rubber a high rate of solidity (280-300 kg/cm^2), and tensile strength (600-750 percent) and, simultaneously, reduces the degree of deformation (from 200,000 up to normal values).

b. All tested materials can be divided into three groups.

(1) The first group of admixtures lowers both the deformation degree and the solidity of vulcanized matters. This group is comprised of emulgator E-1000 and sapel.

(2) The second group of admixtures lowers the defo degree but retains the tensile strength. This group is comprised of mersolates and paraffinic acids.

(3) The third group of admixtures lowers the defo degree at the same time increasing moderately or strongly the solidity. This group is comprised of seral, iron-naphtate, sodium-resinate, etc.

c. It is characteristic of all three groups that they lower the defo-degree to normal figures and considerably increase the **ductility , sometimes up to 1,100 percent (see** tests with benzol-sulfonic acid).

d. The use of all these admixtures usually reduces the elasticity. However, methods have been found to solve this problem also, either by adding smaller quantities of aluminum oxide to the rubber compound or by using special agents for retaining the elasticity (see table 6).

10. a. This research is important because it proves aluminum oxide to be a high quality filling agent for rubber compounds and also helped to considerably simplify production methods and find a furnace design for aluminum oxide production. Aluminum oxide was produced in a test cupola furnace with exterior heating in the Buna Plant. This kind of furnace cannot be considered a model type of an industrial furnace. Muffle-furnaces used for aluminum oxide production in Wolfen and Bitterfeld are also not model furnace types if the volume of aluminum oxide and the importance of this valuable filling agent for future production is considered.

At present perfect furnace types are the modern drum rotary furnaces with exterior and interior heating and cupola furnaces with interior heating. The furnaces have a high production capacity and can be operated continuously.

b. A rotary experimental furnace for aluminum oxide production was tested in the Polysius Plant in Dessau in June 1948. The furnace was 8 meters long and 30 to 40 cm in diameter. Aluminum sulphate was introduced at one end of the drum while the burner head was arranged at the other end. The test showed that the whole active part escaped in the smoke due to the great volatility of aluminum oxide. The part of aluminum oxide which reached the opposite end of the furnace was nonactive. This installation was not usable as separation of a volatile material such as aluminum oxide in gases heated to 1,000° C **is very difficult and** requires a very complicated plant with various systems of **cyclone filters, etc.**

c. Cupola furnaces with interior heating obviously have the same defects. Dr. Moll proposed a noteworthy furnace construction for our aluminum oxide production department. He suggested the insertion of a thermax pipe of small diameter into a conventional rotary furnace. The heating gases cover the outside of the thermax pipe with aluminum sulphate and aluminum oxide inside, while pipe and furnace revolve. However, such a furnace cannot be regarded as a model type as there is a critical shortage of thermax material. The solidity of thermac also rapidly declines at temperatures of 1,000 to 2,000° C.

d. The tests **proved** normal rotary furnaces without thermax or cupola furnaces with interior heating as the most suitable types for the aluminum oxide production. The aluminum oxide is separated from the heating gases by wetting with water or a mild soda solution or other liquids. Experiments of this kind are presently done by Engineer Khycheyan and Dr. Henn.